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APPLICATION NUMBER: ***60/358,364***
FILING DATE: ***February 22, 2002***

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APPLICATION

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PROVISIONAL APPLICATION
Under Rule 53(c)

Sir:

Herewith is a PROVISIONAL APPLICATION
Title: A THREE-WHEELED VEHICLE HAVING A SPLIT RADIATOR AND AN INTERIOR STORAGE COMPARTMENT

Atty. Dkt. PW 265333 M# | RP-00188-US5 Client Ref

Date: February 22, 2002

Including:

1. Specification: 22 pages 2. ☐ Specification in non-English language 3. ☒ Drawings: 19 sheet(s)
4. The invention ☐ was ☒ was not made by, or under a contract with, an agency of the U.S. Government.
   If yes, Government agency/contact # =
5. ☐ Attached is an assignment and cover sheet. Please return the recorded assignment to the undersigned.
   Small Entity Status ø ☒ is Not claimed ☐ is claimed (pre-filing confirmation required)
   NOTE: Do NOT File IDS!
6. ☐ Attached:

This application is made by the following named inventor(s) **(Double check instructions for accuracy.):**

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VWbn.600

9. NOTE: FOR ADDITIONAL INVENTORS, check box ☐ and attach sheet (PAT102A) with same information regarding additional inventors.

	Large/Small Entity		Fee Code
10. Filing Fee	$160/$80	+160	114/214
11. If "non-English" box 2 is X'd, add Rule 17(k) processing fee	$130	+0	139
12. If "assignment" box 5 is X'd, add recording fee.	$40	+0	581
13.	TOTAL FEE ENCLOSED =	$160	

Our Deposit Account No. 03-3975
Our Order No. 9919 (C#) | 265333 (M#)

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APPLICATION UNDER UNITED STATES PATENT LAWS

Atty. Dkt. No. PW 265333
(M#)

Invention: A THREE-WHEELED VEHICLE HAVING A SPLIT RADIATOR AND AN INTERIOR STORAGE COMPARTMENT

Inventor (s): Etienne Guay
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60558054.020202

This is a:

- ☒ Provisional Application
- ☐ Regular Utility Application
- ☐ Continuing Application
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SPECIFICATION

A THREE-WHEELED VEHICLE HAVING A SPLIT RADIATOR AND AN INTERIOR STORAGE COMPARTMENT

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is related to and claims priority to U.S. Provisional Patent Application Serial No. 60/315,689, which was filed on August 30, 2001 and U.S. Patent Application Serial No. 60/330,091, which was filed on October 19, 2001. The disclosures of these related applications are specifically incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0002] The present invention relates to the overall design and construction of a novel three-wheeled vehicle. The three-wheeled vehicle in accordance with the present invention is designed for road use and to permit the driver to lean on the vehicle during operation. Particularly, the present invention relates to a novel three-wheeled straddle-type vehicle having a split radiator associated with the engine. The split radiator includes a pair of cooling portions that are operatively connected and located on opposite sides of the vehicle frame. The cooling portions are disposed at angle with respect to the vertical axis of the vehicle.

2. Description of Related Art

[0003] The novel three-wheeled vehicle of the present invention is a significantly improved vehicle than straddle-type three-wheeled vehicles with two front wheels and one rear wheel that are found in the prior art. For example, U.S. Pat. No. 4,787,470 discloses a three-wheeled vehicle with two front wheels and a sole rear wheel having a body formed by an ATV frame carrying two front and one rear fenders and a saddle type seat. An engine is supported on the frame but is exposed to the exterior of the vehicle body, much like as done in motorcycles. In such a vehicle, the center of gravity of the rider and the vehicle are located higher off the ground than the vehicle contemplated by the present invention.

[0004] United States Patent. No. 4,662,468 also discloses a three-wheeled vehicle with two front wheels and a sole rear wheel. The three-wheeled vehicle of the '468 patent uses a conventional snowmobile chassis, which has been modified to attach two driving wheels at its front portion.

[0005] Similarly, United States Patent. No. 5,564,517 discloses a snowmobile conversion frame kit which includes a frame having two wheels with a steering assembly in the front and a single wheel with a swing arm in the rear. The kit in the '517 patent is designed to be secured to a conventional snowmobile chassis also. Conventional snowmobile chasses offer less rigidity and structural strength than are required for the all-terrain vehicles.

OBJECTS OF THE INVENTION

[0006] It is an object of the present invention to provide a three-wheeled straddle type vehicle having two wheels in the front of the vehicle and one wheel in the rear of the vehicle.

[0007] It is another object of the present invention to provide a three-wheeled straddle type vehicle having a low center of gravity compared to conventional three wheeled vehicles.

[0008] It is another object of the present invention to provide a three-wheeled straddle type vehicle having improved maneuverability and control by comparison with conventional three wheeled vehicles.

[0009] It is another object of the present invention to provide a three-wheeled straddle type vehicle designed for road use.

[0010] It is another object of the present invention to provide a three-wheeled straddle type vehicle having a tubular frame with improved strength.

[0011] It is another object of the present invention to provide a split radiator assembly that is located on opposite sides of the frame to provide an open cavity in the front of the vehicle frame for storage.

[0012] It is another object of the present invention to provide a removable storage compartment in the front of the vehicle frame that can be accessed through a removable lid in the fairing assembly.

[0013] It is another object of the present invention to provide a split radiator assembly that is positioned rearwardly of the front wheels of the three-wheeled vehicle.

[0014] It is yet another object of the present invention to provide a split radiator assembly having first and second cooling portions that are forwardly facing and disposed at an angle.

[0015] It is another object of the present invention to provide access to the engine and the engine service center through the compartment in the front of the vehicle.

SUMMARY OF THE INVENTION

[0016] In response to the foregoing challenges, applicants have developed a novel three-wheeled vehicle that offers improved maneuverability and control. In particular, the present invention relates to a three-wheeled straddle-type vehicle having two wheels in the front of the vehicle and one wheel in the rear of the vehicle. By utilizing a vehicle having, *inter alia*, a tubular frame structure with an upper support assembly, the present invention provides a high performance three-wheeled vehicle with excellent maneuverability and control.

[0017] An aspect of the present invention is that the three-wheeled vehicle is essentially an adaptation of a snowmobile body and frame. A principle benefit of the adapting a snowmobile to the vehicle of the present invention is that the vehicle maintains many of the beneficial structural attributes of a snowmobile, such as its low center of gravity. Further, the closer proximity of the center of gravity of the rider in operation to the low center of gravity of the vehicle plays a factor in providing a much more stable three-wheeled vehicle than three-wheeled vehicles heretofore available, which were adapted from all-terrain vehicle or motorcycle frames.

[0018] Both the '468 and '517 patent lack the upper support structure which is part of the present invention. Further, the three-wheeled vehicles disclosed in the '468 and '517 patents

are based on conventional snowmobile chassis configuration. Accordingly, they necessarily lack the benefits of the new driver positioning and the relationship between the steering control position, the seating position, and the position of the footrests, which permit an improved maneuverability and control of the vehicle, especially a wheeled vehicle intended for road use.

[0019] While a significant aspect of the vehicle of the present invention is that it is a three-wheeled vehicle derived from a snowmobile, the invention herein contemplated is a novel straddle-type three-wheeled vehicle which is able to provide sufficient structural and performance requirements of a high performance road vehicle that is capable of handling an engine output of over 100 horsepower. Indeed, according to another significant aspect of the present invention, a three-wheeled vehicle with a motorcycle engine and a tubular frame is provided.

[0020] A notable aspect of the three-wheeled vehicle of the present invention is that it is designed to operate with an engine capable of generating 125-135 horsepower or even greater and that it is intended for road use. Many of the three-wheeled vehicles heretofore available have been mostly capable of 30 horsepower (hp), and especially less than 100 hp, due to limitations in the structural strength of the frame and the maneuverability and stability of the vehicle. The novel tubular frame assembly of the three-wheeled vehicle of the present invention provides sufficient structural rigidity to withstand the forces experienced during high performance operation of the vehicle. Further, with the improved positioning of the center of gravity of the rider vis-à-vis the center of vehicle, the present invention alleviates the problems of instability and lack of control in sharp turns or during abrupt directional changes.

[0021] Another notable aspect of the three-wheeled vehicle is that it is designed for road use, like a motorcycle. Off-road use is also contemplated, but it is not the primary focus of the design.

[0022] Applicants have developed a novel a three-wheeled straddle type vehicle for operation by at least one rider. In accordance with the present invention, the weight of the rider leans against the three-wheeled vehicle during operation. The three-wheeled vehicle includes a frame having a front portion and a rear portion. A pair of front wheels are rotatably connected to the front portion of the frame. A single rear wheel is rotatably connected to the rear portion of the frame. The vehicle further includes a straddle type vehicle seat connected to the frame. The vehicle further includes an internal combustion engine connected to the frame. The internal combustion engine provides power to drive the pair of front wheels.

[0023] The internal combustion engine includes a radiator for cooling the engine. In accordance with the present invention, the radiator includes a pair of cooling portions. A first cooling portion is located on one side of the frame. A second cooling portion is located on an opposite side of the frame, wherein the second cooling portion is operatively connected to the first cooling portion, wherein the second cooling portion is spaced from the first cooling portion. Each of the first and second cooling portions of the radiator are located rearwardly of the pair of front wheels. The first and second cooling portions may be located at an angle with respect to the vertical axis and longitudinal axis of the vehicle.

[0024] The first and second cooling portions are forwardly facing and each of the first and second cooling portions may be disposed at an angle with respect to a vertical axis of the vehicle. It is contemplated that the first and second cooling portions may be disposed at angle of up to 45° with respect to the vertical axis. The first and second cooling portions of the radiator includes an upper portion and a lower portion. In accordance with the present invention, the upper portion may be located closer to the front portion of the frame than the lower portion. Each cooling portion may include a cooling fan located on the rear surface of the cooling portion. It is also contemplated that the first and second cooling portions may be disposed at an angle with respect to the longitudinal axis of the vehicle. It is contemplated that the first and second cooling portions may be disposed at angle in range of 45° to 135°

with respect to the longitudinal axis. The first and second cooling portions of the radiator includes an inner portion and an outer portion. The inner portion is located adjacent the frame assembly. In accordance with the present invention, the inner portion may be located closer to the front portion of the frame than the outer portion. It is also contemplated that the outer portion may be located closer to the front portion of the frame than the inner portion.

[0025] The vehicle further includes a fairing assembly enclosing at least the front portion of the frame. The fairing assembly includes a first radiator enclosure for enclosing at least a portion of the first cooling portion of the radiator and a second radiator enclosure for enclosing at least a portion of the second cooling portion of the radiator. The front portion of the frame includes a cavity. The fairing assembly includes a removable cover to provide access to the cavity. A removable storage compartment is located within the cavity. The cavity provides access to at least a portion of the internal combustion engine and an engine service center.

[0026] The vehicle further includes an air inlet passageway formed in the front portion of the frame. An oil cooler assembly is connected to the internal combustion engine for cooling engine oil circulating through the internal combustion engine. A flow of air is directed through the air inlet passageway over the oil cooler assembly to cool the oil in the oil cooler assembly. The oil cooler assembly is located between the first cooling portion and second cooling portion.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] The invention will be described in conjunction with the following drawings in which like reference numerals designate like elements and wherein:

[0028] Fig. 1 is a front view of the three-wheeled straddle-type vehicle in accordance with an embodiment of the present invention;

[0029] Fig. 2 is a right side view of the three-wheeled straddle-type vehicle of Fig. 1;

[0030] Fig. 3 is a top view of the three-wheeled straddle-type vehicle of Fig. 1;

[0031] Fig. 4 is a front left perspective view of the frame assembly for the three-wheeled straddle-type vehicle of Figs. 1-3;

[0032] Fig. 5 is a left side view of the frame assembly for the three-wheeled straddle-type vehicle;

[0033] Fig. 6 is a top view of the frame assembly;

[0034] Fig. 7 is a front view of the frame assembly;

[0035] Fig. 8 is a rear view of the frame assembly;

[0036] Fig. 9 is a rear left perspective view of the frame assembly;

[0037] Fig. 10 is a partial schematic side view of the vehicle in accordance with the present invention illustrating the split radiator and cooling assembly;

[0038] Fig. 11 is a partial left rear schematic side view of the vehicle illustrating the split radiator and cooling assembly;

[0039] Fig. 12 is a front view of the radiator cover of the fairing assembly;

[0040] Fig. 13 is a side view of the radiator cover of the fairing assembly;

[0041] Fig. 14 is a front right perspective view of the radiator cover of the fairing assembly;

[0042] Fig. 15 is a rear perspective view of one cooling portion of the split radiator in accordance with the present invention;

[0043] Fig. 16 is a left front perspective view of the storage compartment in the front portion of the fairing assembly;

[0044] Fig. 17 is a front top view of the storage compartment in the front portion of the fairing assembly;

[0045] Fig. 18 is a top schematic view illustrating one orientation of the first and second cooling portions, shown in phantom, disposed at an angle with respect to the longitudinal axis of the vehicle; and

[0046] Fig. 19 is a top schematic view illustrating another orientation of the first and second cooling portions, shown in phantom, disposed at an angle with respect to the longitudinal axis of the vehicle.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0047] A three-wheeled straddle type vehicle 10 in accordance with the present invention is generally illustrated in Figs. 1-3. The vehicle 10 is designed with a straddle-type seat assembly 90 that preferably accommodates two adult-sized riders, a driver and a passenger. While the vehicle 10 is not designed to accommodate more than two adult-sized riders, the present invention contemplates that the design of vehicle 10 may be changed easily to accommodate more than two adult-sized riders.

[0048] It should be noted that the conventions "left," "right," "front," "rear," "up," and "down" are defined according to the normal, forward travel direction of the vehicle being discussed. As a result, the "left" side of a vehicle corresponds to the left side of a rider seated in a forward-facing position on the vehicle.

[0049] The vehicle 10 includes a left front wheel 11, a right front wheel 12 and a rear wheel 13. The left and right front wheels 11 and 12 have tires 111 and 121 secured thereto, respectively. The rear wheel 13 has tire 131 secure thereto. Each of the wheels 11, 12 and 13 is sized to accommodate a 15-inch automotive tire. The present invention, however, is not limited to equal sized wheels; rather, it is contemplated that the front wheels 11 and 12 may be smaller in size to accommodate a 13-inch automotive tires. Furthermore, other wheel sizes are considered to be well within the scope of the present invention.

[0050] The front wheels 11 and 12 are supported by a front suspension assembly 20. The rear wheel 13 is supported by a rear suspension assembly 30. The front suspension assembly 20 and the rear suspension assembly 30 are secured to a vehicle frame assembly 40, illustrated in Fig. 4. The front suspension assembly 20 includes a pair of A-support arms or

U-support arms 21 and a shock absorber 22 extending from each side of the frame assembly 40 to support the wheels 11 and 12.

[0051] As shown in Fig. 4, the frame assembly 40 of the vehicle 10 includes left and right laterally-spaced rear suspension anchor brackets 41 and 42. The rear suspension anchor brackets 41 and 42 generally form vertically and longitudinally extending reinforced plates. The anchor brackets 41 and 42 are preferably made of a strong light material such as cast aluminum. Left and right laterally extending swing arm pivot bores 411 and 421 are centrally disposed on each anchor bracket 41 and 42 to accommodate pivotal mounting of the rear suspension swing arm.

[0052] Laterally-spaced left and right frame legs (or spars) 43 and 44 extend upwardly and forwardly from upper forward portions of the left and right rear suspension anchor brackets 41 and 42, respectively. As illustrated in Fig. 2, the outer side of the frame leg 44 is visible from the side of the vehicle 10.

[0053] An engine 50 is secured to the vehicle frame assembly 40 through an engine cradle assembly 45. The engine 50 may be secured directly to the frame assembly 40 at several points of attachment. Alternatively, the engine 50 may be secured to the frame assembly 40 using a suitable mounting assembly, not shown. The engine 50 is supported just behind the front suspension assembly 20 just above the bottom of the frame assembly 40. This positioning provides a lower center of gravity, which is useful for ensuring good handling and stability of the vehicle 10. Because of the rigidity and improved structural strength of the frame assembly 40, the engine 50 can generate 125-135 horsepower or more without compromising the operation of the vehicle 10. The frame assembly 40 provides sufficient structural rigidity to withstand the forces created during high performance operation of the vehicle 10. In dramatic contrast, conventional three-wheeled vehicles have incorporated engines that generate only 30 horsepower (or less) due to limitations in the structural strength of their frames and maneuverability and stability of their construction.

[0054] The engine 50 may be an internal combustion engine. Preferably, the engine 50 is a four-stroke engine. Specifically, the engine 50 may be a 1000cc four-stroke engine manufactured by ROTAX®. The vehicle 10 in accordance with the present invention, however, is not limited to a four-stroke engine; rather, it is contemplated that a 600cc two-stroke engine may also be used. Furthermore, other sizes are considered to be well within the scope of the present invention.

[0055] As shown in Fig. 4, an engine cradle assembly 45 extends forwardly from the lower front ends of the rear suspension anchor brackets 41 and 42. The engine cradle assembly 45 includes a rear engine support cross brace 451 that extends laterally between the lower front ends of the left and right rear suspension anchor brackets 41 and 42. Laterally spaced left and right lower rear engine anchors 452 and 453 extend forwardly from the engine support cross brace 451 and include engine mounting holes.

[0056] The engine cradle assembly 45 also includes left and right support legs 454 and 455 that are attached to the left and right rear suspension anchor brackets 41 and 42, respectively. The support legs 454 and 455 extend forwardly and laterally-inwardly from their respective rearward portions to their forward portions. A laterally extending support leg bracket 456 is connected to the forward portions of the support legs 454 and 455. The left and right engine support legs 454 and 455 and the engine support cross brace 451 generally form a triangle when viewed from above.

[0057] The engine cradle assembly 45 further includes a forward engine cradle plate 457 that is connected to a forward portion of the support leg bracket 456. Left and right forward engine anchors 458 and 459 extend rearwardly and upwardly from the plate 457 and include engine mounting holes.

[0058] The engine 50 is mounted to the forward engine anchors 458 and 459, upper rear engine anchors 4931 and 4932 (see Fig. 9), and the lower rear engine anchors 452 and 453. Because the engine 50 is attached to the frame assembly 40 at three different places (as

viewed from the side, see Fig. 5), the engine 50, itself, adds structural rigidity to the frame assembly 40 by providing a structural connection between the front suspension sub-frame 46 and the rear suspension anchor brackets 41 and 42.

[0059] The front suspension sub-frame 46 is connected to a forward end of the engine cradle plate 457. The front suspension assembly 20 is secured to the sub-frame 46. The front suspension sub-frame 46 includes a plate 461. The plate 461 is generally V-shaped as viewed from the front. The rear edge of the V-shaped plate 461 is connected to the engine cradle plate 457. The sub-frame 46 further includes a forward transverse plate 462 that is connected to the front end of the V-shaped plate 461. The plate 462 includes an opening 4621 through which air enters the frame assembly 40 where it is channeled to an oil cooler assembly 51, as shown in Figs. 10 and 11. Together, the variously oriented plates 457, 461, 462 provide a strong, rigid sub-frame 46. Left and right vertically and longitudinally extending side panels 463 and 464 extend upwardly from the left and right sides of the V-shaped plate 461. Each side panel 463 and 464 forms a triangle having a flat lower side attached to the V-shaped plate 461 when viewed from the side. The engine 50 includes a radiator having spaced cooling portion 52 located on opposite sides of the frame assembly 40.

[0060] As shown for example in Fig. 4, a laterally-extending front cross brace 47 connects between upper ends of the side panels 463 and 464 (i.e., at the upper vertices of the triangles formed by the side panels 463 and 464) of the front suspension sub-frame 46. Forward ends of the left and right frame legs 43 and 44 likewise connect to the front cross brace 47. The front cross brace 47 extends laterally outwardly beyond its connection points to provide left and right shock absorber anchors 471 and 472 for the front suspension assembly 20.

[0061] Radiators permit liquid cooling of the engine. The liquid coolant is cooled by air, as is known in the art. Conventional engines include a radiator that is positioned in the front of the vehicle. This placement of the radiator, however, occupies valuable space in the front portion of the vehicle, which may be used to provide access to the engine and an engine

service center and for storage. The novel three-wheeled vehicle 10 of the present invention addresses and solves this problem. The engine 50 includes a radiator for cooling the engine that has a pair of cooling portions 52. Rather than being located in the front portion of the frame assembly 40. The first and second cooling portions 52 are located on opposite outer sides of the frame assembly 40, as shown in Fig. 11. The first and second cooling portions 52 are operatively connected to each other such that the portions function as a single unit. As shown in Figs. 2 and 3, each of the first and second cooling portions of the radiator are located rearwardly of the pair of front wheels 11 and 12.

[0062] As seen in Figs. 10, 11 and 15, the cooling portions are forwardly facing. In the embodiment illustrated, they are disposed at an angle with respect to a vertical axis of the vehicle. The cooling portions 52 may be disposed at an angle up 45° with respect to the vertical axis of the vehicle. The first and second cooling portions 52 include an upper portion and a lower portion. As seen in Figs. 10 and 11, the upper portion of each cooling portion is located closer to the front portion of the frame assembly 40 than the lower portion. Cooling may be additionally aided by an automatic fan 53 installed behind the cooling portion 52, as shown in Fig. 15 for when the vehicle 10 is idling for an extended period of time.

[0063] It is also contemplated that the first and second cooling portions 52 may be disposed at an angle with respect to the longitudinal axis of the vehicle 10. In this arrangement, the first and second cooling portions 52 of the radiator include an inner portion and an outer portion. The inner portion is located adjacent the frame assembly 40. In accordance with the present invention, the inner portion may be located closer to or further from the front portion of the frame assembly 40 than the outer portion. It is contemplated that the first and second cooling portions 52 may be disposed at angle in the range of 45° to 135° with respect to the longitudinal axis of the vehicle 10, as shown in Figs. 18 and 19.

[0064] As illustrated in Figs. 1-3, a fender assembly 60 is associated with each of the front wheels 11 and 12. As shown in Figs. 1 and 2, each fender assembly 60 includes a cover

assembly 61 that covers the top rear portion of the tires 111 and 121. The fender assembly 60 prevents dirt, water and road debris from being kicked up onto the rider, while the rider operates the vehicle 10. Each fender assembly 60 is linked to the front suspension assembly 20 and a steering assembly 70 such that the cover assemblies 61 move in connection with the wheels 11 and 12 during steering of the vehicle 10. This arrangement ensures that the tires 111 and 121 will not kick up dirt, water and road debris as the vehicle 10 turns. Each fender assembly 60 preferably includes a turn signal 62 located on the top surface of each cover assembly 61, as shown in Figs. 1 and 3.

[0065] The steering of the front wheels 11 and 12 is accomplished through the use of the steering assembly 70. The steering assembly 70 includes handlebars 71 and steering linkages (not shown) connected to the wheels 11 and 12 for purposes of turning the wheels 11 and 12 in response to movement of the handlebars 71. The steering assembly 70 of the vehicle 10 is preferably provided with a progressive steering system (not shown). The progressive steering system allows the handlebars 71 to be turned to their maximum position (about 50 degrees of arc), while the wheels 11 and 12 turn to an increasingly greater extent at the end of the course. The linkage between the handle bars 71 and the steering linkages (not shown) that makes progressive steering possible is designed so that small variations in the handlebars 71 when the vehicle is travelling straight will not turn the wheels to any significant degree. When the vehicle 10 is travelling forward, especially at high speed, there should be a good amount of play in the handlebars 71 so that small movements made by the driver do not result in a sudden (or unexpected) turning of the vehicle 10. When the handlebars 71 are turned to a more significant displacement, the degree of play preferably should decrease as the angular displacement of the handlebars 71 increases. The closer the handle bars are turned to their most rotated position, the less play there should be in the linkage between the handlebars 71 and the wheels 11 and 12 of the vehicle 10.

[0066] The front of the vehicle 10 includes a fairing assembly 80, which encloses the engine 40 to protect it and to provide an external shell that can be decorated so that the vehicle is aesthetically pleasing. The fairing assembly 80 is preferably made from fiberglass having a gel coat. The fairing assembly 80 includes an upper portion 81, a hood 82 removably secured to the upper portion 81 and a bottom pan 83. The fairing assembly 80 is secured to the vehicle frame assembly 40 by a plurality of fairing anchors. At least two fairing anchors 84 and 85 are illustrated in Fig. 10.

[0067] The hood 82 includes at least one air intake opening 821 to provide a supply of air to an air box (not shown) for supplying air to the air intake of the engine 50 and/or oil cooler 51. As previously mentioned, the hood 82 is removable to permit access to an interior storage compartment 200 located at the front portion of the vehicle 10, as illustrated in Figs. 16 and 17. The space for the storage compartment 200 is created by the relocation of the radiator to the sides of the vehicle 10 using the first and second cooling portions 52. The storage compartment 200 offers the driver a place to store personal belongings when the vehicle 10 is parked in a public location. The storage compartment 200 may include a removable insert (not shown) having separate storage compartments formed therein. Access to the engine 40 and the engine service center is facilitated by removing the insert. The engine service center clusters the vehicle battery, oil reservoir, radiator coolant reservoir, fuse box, engine oil dipstick and related service components in a central location so that the components can be easily accessed and serviced.

[0068] The upper portion 81 of the fairing assembly 80 further includes a cluster of headlamps 811. A windshield 812 may be connected to the handlebars 71 or the upper portion 81 of the fairing assembly 80 near at the front section, as shown in Fig. 1.

[0069] The bottom pan 83 of the fairing assembly 80 may also include one or more fog lamps 831. The bottom pan 83 includes a pair of lateral extensions, which form radiator covers 832. The radiator covers 832 illustrated in Figs. 12-14 surround and protect a pair of laterally

spaced radiator assemblies 52, which together form a radiator for the engine 50. As evident from Fig. 2, the rider's feet are positioned on foot pegs 101 and 102 to rear of the radiator covers 832. As such, the radiator covers 832 also function to provide a windbreak for the feet and lower legs of the driver.

[0070] The radiator covers 832 are integrally formed of the same material as the bottom pan 83 of the fairing assembly 80. As shown in Fig. 12, the front side of the radiator cover 832 includes at least one opening 8321 to permit the flow of air into the interior of the radiator cover 832 to cool the cooling portion of the radiator 52 located therein. The openings 8321 are covered with a grill assembly 8322 to prevent rocks and other debris from contacting and damaging the radiator 52.

[0071] The vehicle 10 includes a cushioned rider seat assembly 90 that is mounted to the frame assembly 40 between the front wheels 11 and 12 and the rear wheel 13, as shown in Figs. 1-3. The seat assembly 90 is connected to an upper support assembly 48 and a seat support assembly 49 of the vehicle frame assembly 40. The seat support assembly 49 is connected to the anchor brackets 41 and 42 through seat links 495 and 496. The upper support assembly 48 includes a steering column bracket 481. A pair of front supports 482 and 483 extend from the front brace 47 to the steering column bracket 481. The supports 482 and 483 include fairing anchors 84 and 85. A pair of rear supports 484 and 485 extend rearwardly from the steering column bracket 481 towards the seat support assembly 49. The rear supports 484 and 485 include seat anchors 486 and 487 for securing a front portion of the seat assembly 90 thereto.

[0072] The seat support assembly 49 includes left and right longitudinal legs 491 and 492. The longitudinal legs 491 and 492 include forward portions that are connected to upper portions of the anchor brackets 41 and 42. A front cross brace 493 extends between the legs 491 and 492 at a forward end. Upper rear engine anchors 4931 and 4932 extend from the support 493. A rear suspension link 494 extends between rear portions of the longitudinal

legs 491 and 492. Left and right rear suspension support links 495 and 496 extend from the rear portions of the anchor brackets 41 and 42 to the rearward portions of the longitudinal legs 491 and 492, respectively. A U-shaped rear seat frame 497 is secured to the legs 491 and 492 and the rear suspension support links 495 and 496.

[0073] The cushioned seat assembly 90 is mounted to the seat anchors 486 and 487 and rests on the rear supports 484 and 485 and the U-shaped seat frame 497. The seat assembly 90 is positioned so that a weight of the rider thereon will be disposed generally above the rear suspension link 494, which supports the rear suspension links. Consequently, the weight of the rider will be transferred through the seat assembly 90 and frame assembly 40 to the rear suspension link 494, and from the rear suspension link 494 to the rear suspension assembly 30 and to the front suspension subframe 46 and front suspension assembly 20 through the front supports 482 and 483.

[0074] As seen in Fig. 5, the longitudinal legs 491 and 492 and U-shaped seat frame 497 of the seat support assembly 49 form a support surface 498 for the seat assembly 90. The support surface 498 is generally upwardly concave with the longitudinal legs 491 and 492 and U-shaped seat frame 497 meeting at an obtuse angle to form a V-shaped dip 499. The seat assembly 90 is contoured to have a dip 91 that generally follows and complements the dip 499 thus forming an upwardly concave seating surface 92, as shown in Figs. 2 and 10. The seat assembly 90 also has inwardly tapered side surfaces 93, as shown in Figs. 3 and 11, near the dip 91 so that the rider can securely clamp the lower legs on either side of dip 91. A pair of side wings 94 extend forwardly from dip 91 and inwardly tapered sections 93. The side wings 94 are padded and form a clamping area for a rider's knees when a rider is shifted forward.

[0075] The seat assembly 90 is formed of materials known for seating use on various types of vehicles including all terrain vehicles, motorcycles and snowmobiles. Preferably, the seat assembly 90 is formed of a molded plastic contoured shell with a resilient, foam inner support

member supported by the shell and a durable all weather outer surface covering, such as vinyl, formed over the resilient member.

[0076] The seat assembly 90 can be hinged to the seat anchors 486 and 487 and latched at an opposite end with a latch assembly (not shown) to provide access to the components or storage beneath seat assembly 90, if desired. It is also contemplated that the seat assembly 90 may be fixed on the U-shaped seat frame 497.

[0077] As seen in Figs. 2 and 3, the contour of seat assembly 90 provides for central dip 91 portion that slopes gradually up to a raised portion 95 at the rear of the vehicle 10. The rear end of seat assembly 90 is preferably higher than dip 91. Also, the rear end of the seat assembly is preferably wider than the tapered side surfaces 93. The front end of the seat assembly 90 is also preferably a raised portion 96 that is higher with respect to a horizontal support surface than dip 91. As shown in Figs. 2 and 10, the front raised portion 96 is higher than rear raised portion 95. Front raised portion forms a cushioned area that protects a rider from impact with the gas tank or steering assembly 70, along with the cushioned side wings 94 that allow a rider to bear against the sides of vehicle 10.

[0078] Front raised portion 96 is shown as an integral portion of seat 90. However, if desired, front raised portion 96 could be a separate cushioned component. Similarly, side wings 94 are shown as integral extensions of seat assembly 90, but could be formed as separate cushioned or padded components. The relative vertical heights of the seat portions could also vary. For example, rear end of the seat 90 could be level or tapered at the back so that the rear end is level with the dip portion. The relative taper can also vary, but it is desired that the tapered section be sufficiently narrow to allow a rider to sit comfortably and securely with the lower legs and knees straddling the vehicle 10. The dip 91 coincides with a tapered side sections 93. As shown in Fig. 10, the dip 91 is positioned generally vertically above the foot pegs 101 and 102. The dip 91 and the tapered sections 93 are designed to support a rider at the knee and lower thigh with the feet being supported on the foot pegs 101

and 102, which are described in greater detail below. By this positioning, a rider is able to lean or slide sideways while riding to facilitate maneuvering the vehicle 10 when the rider's knee is positioned slightly above the seat over dip 91.

[0079] It is also contemplated that the seat assembly 90 may also be provided with only tapered sections 93, with no dip such that the side profile of the seat would be flat. Such a configuration would allow a rider to still clamp the sides of the seat while riding.

[0080] During operation, the driver is supported on the seat assembly 90. Driver's feet are supported by a left foot peg 101 and a right foot peg 102 located on opposite sides of the vehicle 10. The foot pegs 101 and 102 are secured to the anchor brackets 41 and 42, respectively. As illustrated, for example, in Fig. 10, the left foot peg 101 is connected to the lower end of the anchor bracket 41. The right foot peg 102 is similarly connected to the lower end of the anchor bracket 42. The foot pegs 101 and 102 are generally in alignment with the dip 91 in the seat assembly 90. The feet of the driver are supported on the foot pegs 101 and 102 during operation of the vehicle 10. The foot pegs 101 and 102 are designed to contact the lower surface of the driver's feet.

[0081] The vehicle 10 further includes a left toe hold 103 and a right toe hold 104 that are located on opposite sides of the vehicle 10. Like the foot pegs 101 and 102, the toe holds 103 and 104 are secured to the anchor brackets 41 and 42, respectively. As shown in Fig. 10, the left toe hold 103 is vertically and horizontally spaced from the left foot peg 101. The right toe hold 104 is similarly spaced with respect to the foot peg 102. The toe holds 103 and 104 are designed to contact the upper surface of the driver's feet, when the driver leans to one of the sides of the vehicle 10 during operation (e.g., while leaning into a turn). The toe holds 103 and 104 are illustrated as pegs that extend from the vehicle frame 40. The present invention, however, is not limited to the use of pegs; rather, it is contemplated that the toe holds 103 and 104 may take the form of a foot guard that partially surrounds the upper surface of the driver's foot.

[0082] The toe holds 103 and 104 are generally vertically spaced from a left foot pedal 105 and a right foot pedal 106, respectively. The foot pedals 105 and 106 may be used to control braking and shifting during operation of the vehicle 10.

[0083] As previously mentioned, the vehicle 10 is designed to accommodate more than one rider. It is contemplated that the vehicle 10 may be used by a driver and a rider, seated behind the driver. During operation, the rider is also supported on the seat assembly 90. As shown in Fig.11, the rider's feet are supported by a left rear foot peg 107 and a right rear foot peg 108 located on opposite sides of the vehicle 10. The foot pegs 107 and 108 are secured to the swing arm of the vehicle 10. As illustrated, for example, in Fig. 10, the left foot peg 101 is spaced from the left rear foot peg 107. The right foot peg 102 is similarly spaced from the right rear foot peg 108. The feet of the rider are supported on the foot pegs 107 and 108 during operation of the vehicle 10.

[0084] It is contemplated that the vehicle 10 may include rear toe holds that are located on opposite sides of the vehicle 10. The rear toe holds are designed to contact the upper surface of the rider's feet, when the rider leans to one of the sides of the vehicle 10 during operation (e.g., while leaning into a turn). It is also contemplated that the foot pegs 101, 102, 107 and 108 may be replaced with a pair of foot platforms that extend along the opposite sides of the vehicle 10. The platforms are positioned such that are located below the foot pedals 105 and 106 so as not to interfere with the operation of the vehicle.

[0085] During operation, the driver straddles the seat assembly 90 such that the drivers legs are located adjacent the tapered side surfaces 93 of the seat assembly 90. The drivers feet are positioned on the foot pegs 101 and 102. The driver's hands grip the handlebars 71. The handlebars 71 include controls for controlling the engine throttle and braking. With this arrangement, one hand controls the operation of the engine throttle. The other hand control operates at least part of the braking operation of the vehicle 10. The shifting between engine gears is controlled by operation of one of the foot pedals 105 and 106. The shifting is

accomplished by either pressing down on the pedal or applying an upward force on the pedal to shift upward or downward. The braking of the vehicle 10 is also controlled by operation of the other of the foot pedals 105 and 106. The control may be similar to or the same as that for a motorcycle.

[0086] It is contemplated that the vehicle 10 may be operated for road use or it may be operated by skilled professionals on a racing track. During operation, it is anticipated that the driver will likely lean to one side of the vehicle 10 to shift the driver's weight while turning the vehicle 10 or driving through a curve. The arrangement of the seat assembly 90 and the foot pegs 101 and 102 permit the driver to shift his or her weight during the operation of the vehicle 10 to improve maneuverability and control. In the event that that driver leans to left side of the vehicle 10 during operation of the vehicle 10, the driver's position on the seat assembly 90 is altered. The driver's right foot engages the right toe hold 104. The provision of the dip 91 and the tapered side surfaces 93 permit the driver to maintain his grip of the seat with his or her legs. As the driver leans to the right, the driver's left foot engages the left toe hold 103. The provision of the toe holds 103 and 104 permit the driver's feet to remain in engagement with the vehicle 10 during turns or while leaning on the vehicle.

[0087] While the invention has been described in connection with what is presently considered to be the most practical and preferred embodiments, it is to be understood that the invention is not to be limited to the disclosed embodiments and elements, but, to the contrary, is intended to cover various modifications, combinations of features, equivalent arrangements, and equivalent elements included within the spirit and scope of the appended claims. Furthermore, the dimensions of features of various components that may appear on the drawings are not meant to be limiting, and the size of the components therein can vary from the size that may be portrayed in the figures herein. Thus, it is intended that the present invention covers the modifications and variations of the invention, provided they come within the scope of the appended claims and their equivalents.

What is claimed is:

1. A three wheel straddle type vehicle for operation by at least one rider, wherein the weight of the rider leans against the vehicle during operation, the vehicle comprising:

a frame having a front portion and a rear portion;

a pair of front wheels rotatably connected to the front portion of the frame;

a single rear wheel rotatably connected to the rear portion of the frame;

a straddle type vehicle seat connected to the frame; and

an internal combustion engine connected to the frame, wherein the internal combustion engine provides power to drive at least one of the single rear wheel and the pair of front wheels, wherein the internal combustion engine includes a radiator for cooling the engine, wherein the radiator includes a pair of cooling portions, wherein a first cooling portion is located on one side of the frame, wherein a second cooling portion is located on an opposite side of the frame, wherein the second cooling portion is operatively connected to the first cooling portion, wherein the second cooling portion is spaced from the first cooling portion.

2. The three wheel straddle type vehicle according to claim 1, wherein each of the first and second cooling portions are located rearwardly of the pair of front wheels.

3. The three wheel straddle type vehicle according to claim 1, wherein each of the first and second cooling portions is forwardly facing.

4. The three wheel straddle type vehicle according to claim 3, wherein each of the first and second cooling portions is disposed at an angle with respect to a vertical axis of the vehicle.

5. The three wheel straddle type vehicle according to claim 4, wherein each of the first and second cooling portions includes an upper portion and a lower portion, wherein the upper portion is located closer to the front portion of the frame than the lower portion.

6. The three wheel straddle type vehicle according to claim 3, wherein each of the first and second cooling portions is disposed at an angle with respect to a longitudinal axis of the vehicle.

7. The three wheel straddle type vehicle according to claim 6, wherein the angle is between 45° and 135°.

8. The three wheel straddle type vehicle according to claim 1, further comprising a fairing assembly enclosing at least the front portion of the frame.

9. The three wheel straddle type vehicle according to claim 8, wherein the fairing assembly includes a first radiator enclosure for enclosing at least a portion of the first cooling portion of the radiator and a second radiator enclosure for enclosing at least a portion of the second cooling portion of the radiator.

10. The three wheel straddle type vehicle according to claim 8, wherein the front portion of the frame includes a cavity, wherein the fairing includes a removable cover to provide access to the cavity.

11. The three wheel straddle type vehicle according to claim 10, further comprising a removable storage compartment located within the cavity.

12. The three wheel straddle type vehicle according to claim 10, wherein the cavity provides access to at least a portion of the internal combustion engine.

13. The three wheel straddle type vehicle according to claim 1, further comprising:

an air inlet passageway formed in the front portion of the frame; and

an oil cooler assembly connected to the internal combustion engine for cooling engine oil circulating through the internal combustion engine, wherein a flow of air is directed through the air inlet passageway over the oil cooler assembly.

14. The three wheel straddle type vehicle according to claim 13, wherein the oil cooler assembly is located between the first cooling portion and second cooling portion.

ABSTRACT OF THE DISCLOSURE

A novel three-wheeled straddle type vehicle for operation by at least one rider is disclosed having a split radiator located on opposite sides of the vehicle frame. The location of the split radiator on the sides of the frame create a storage compartment in the front portion of the vehicle frame.

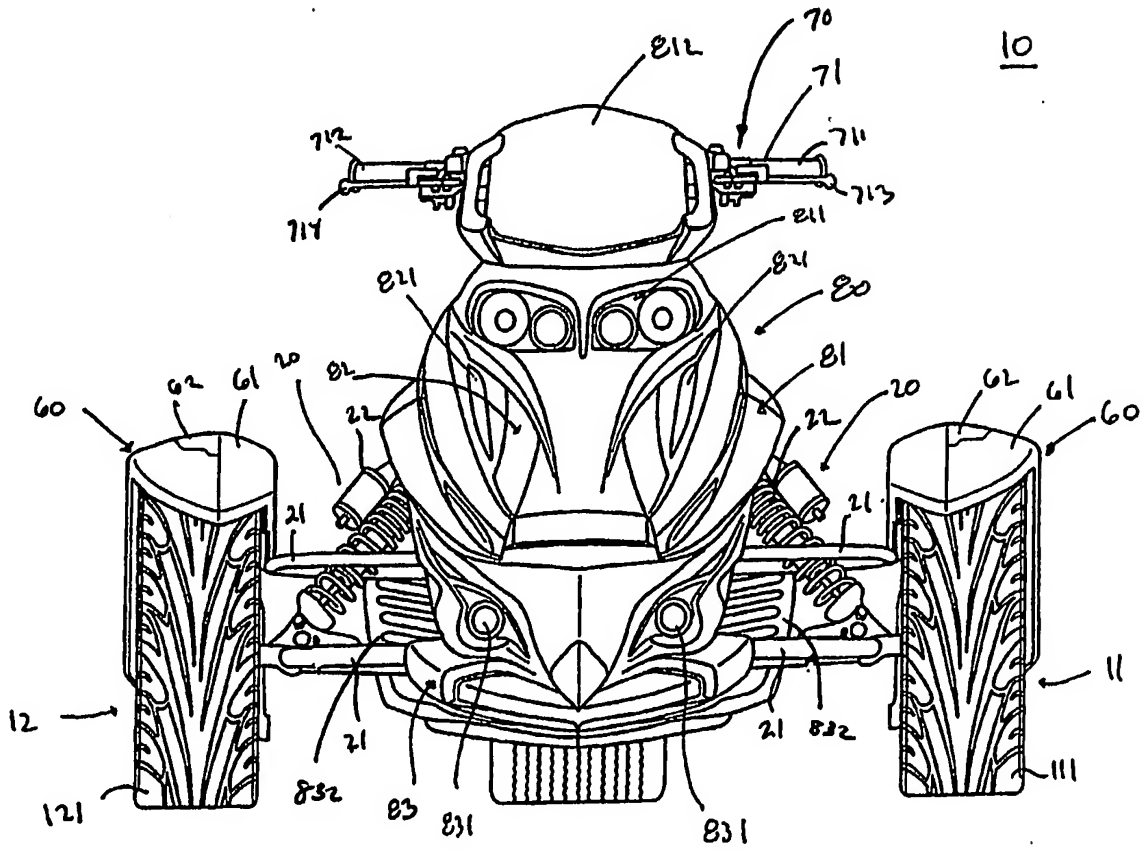
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FIG. 1

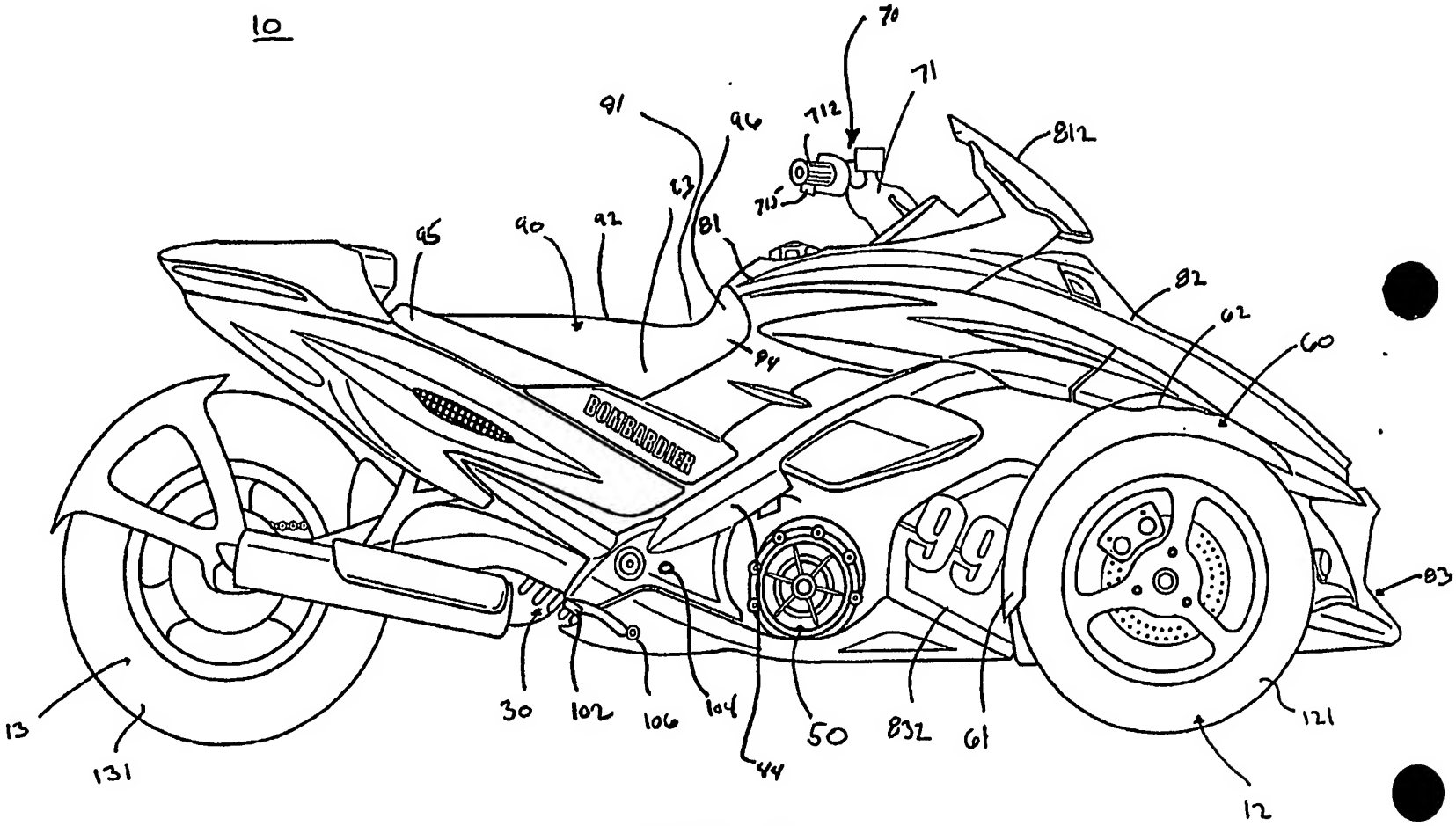

FIG. 2

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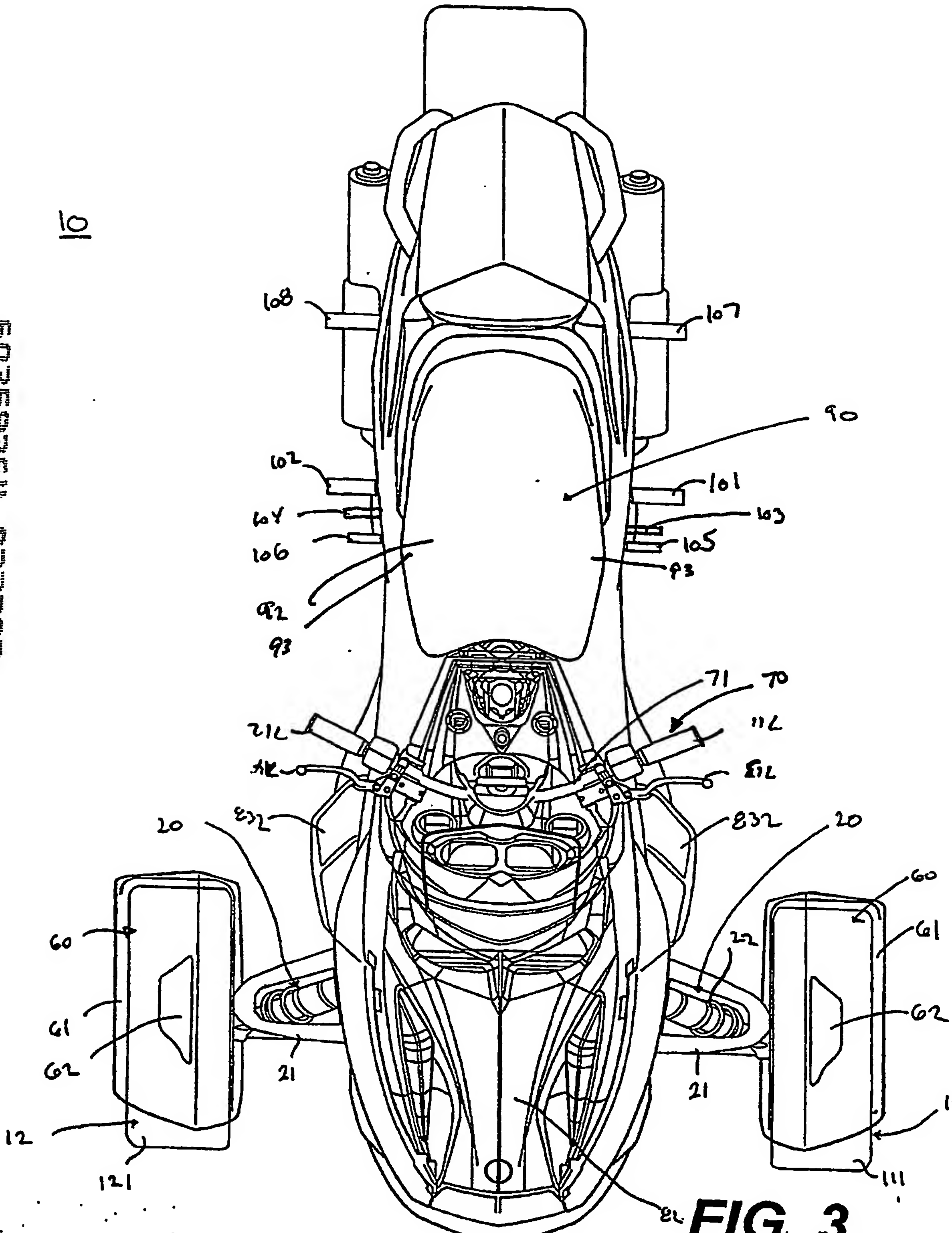

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FIG. 3

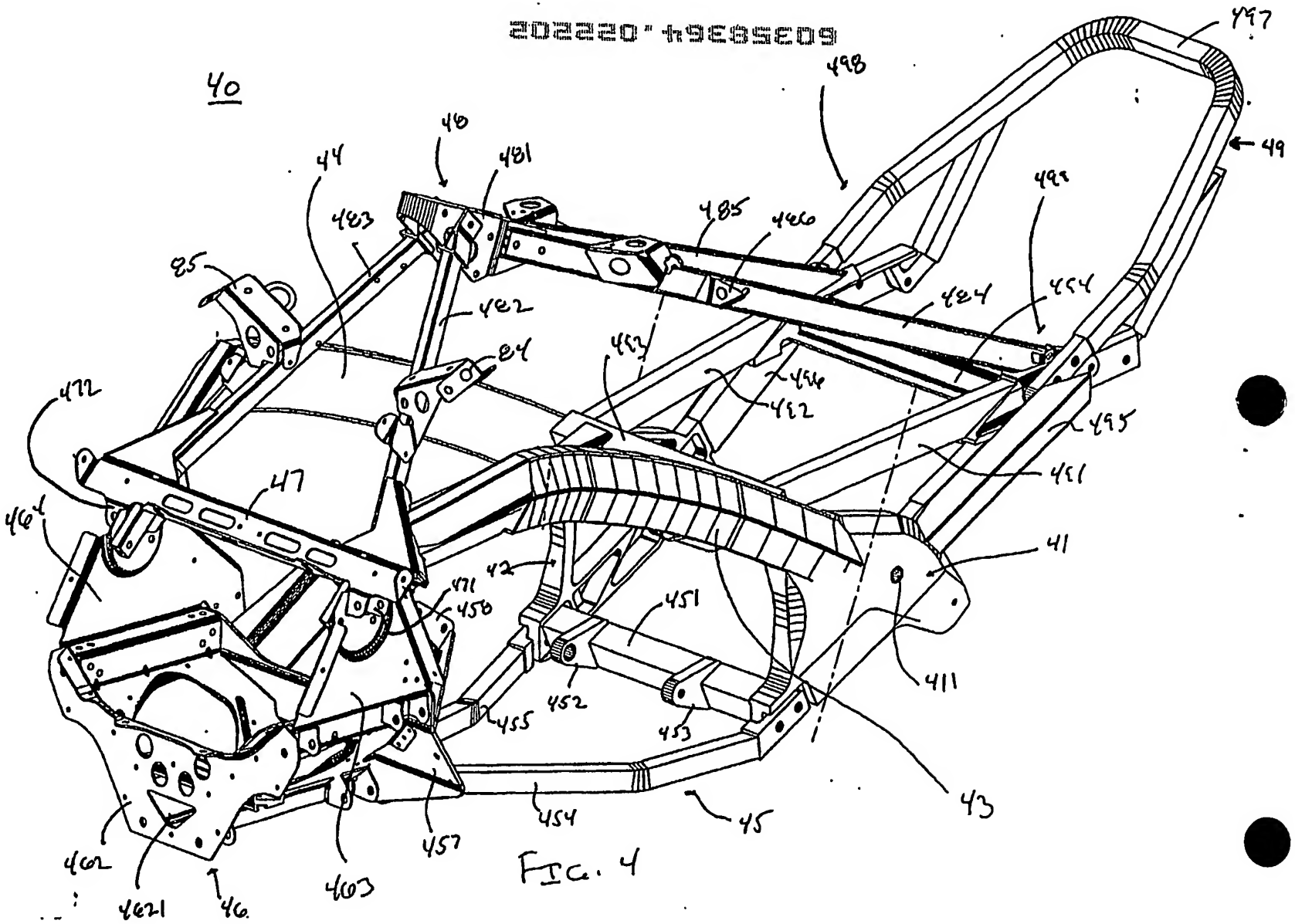
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FIG. 4

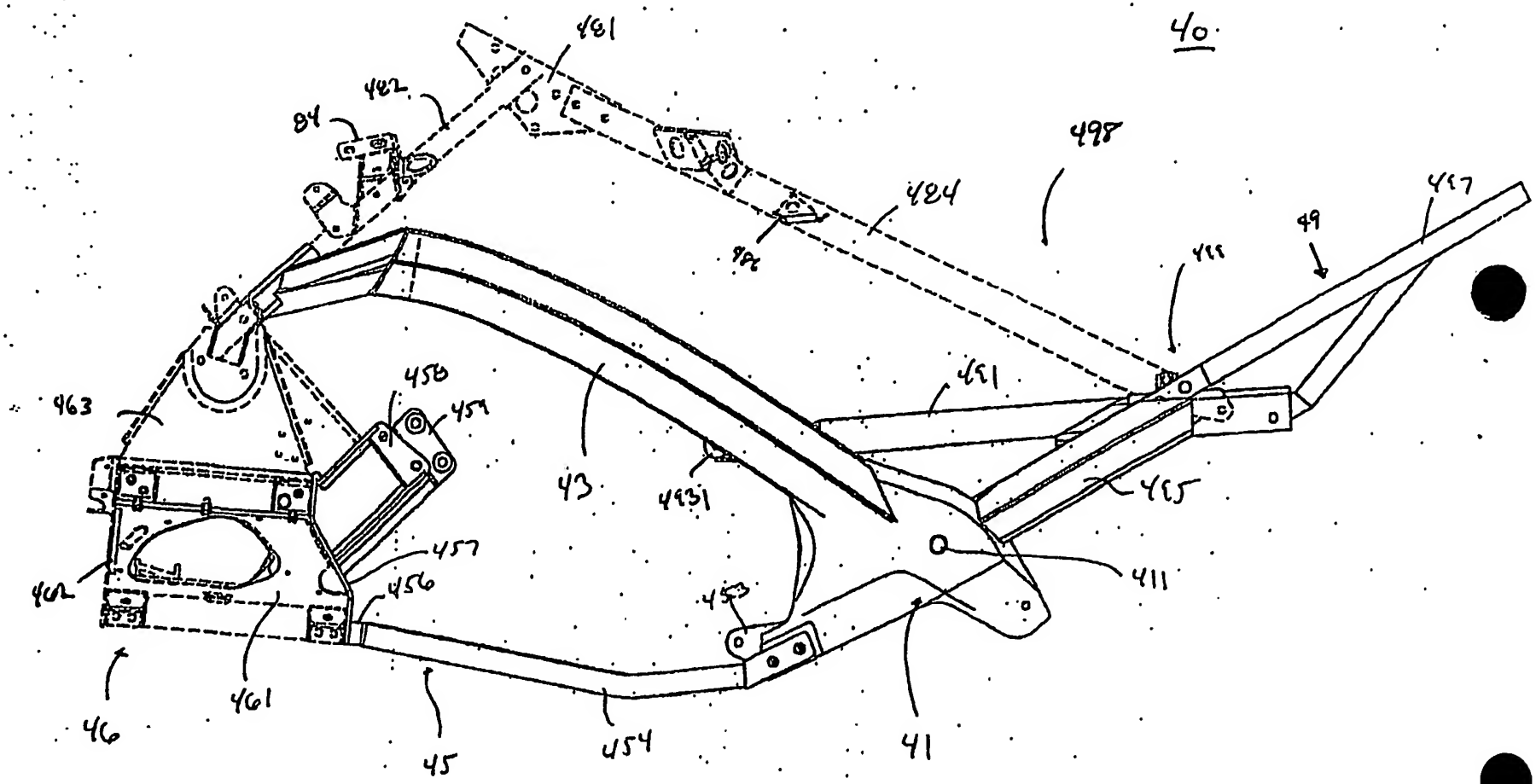
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FIG. 5

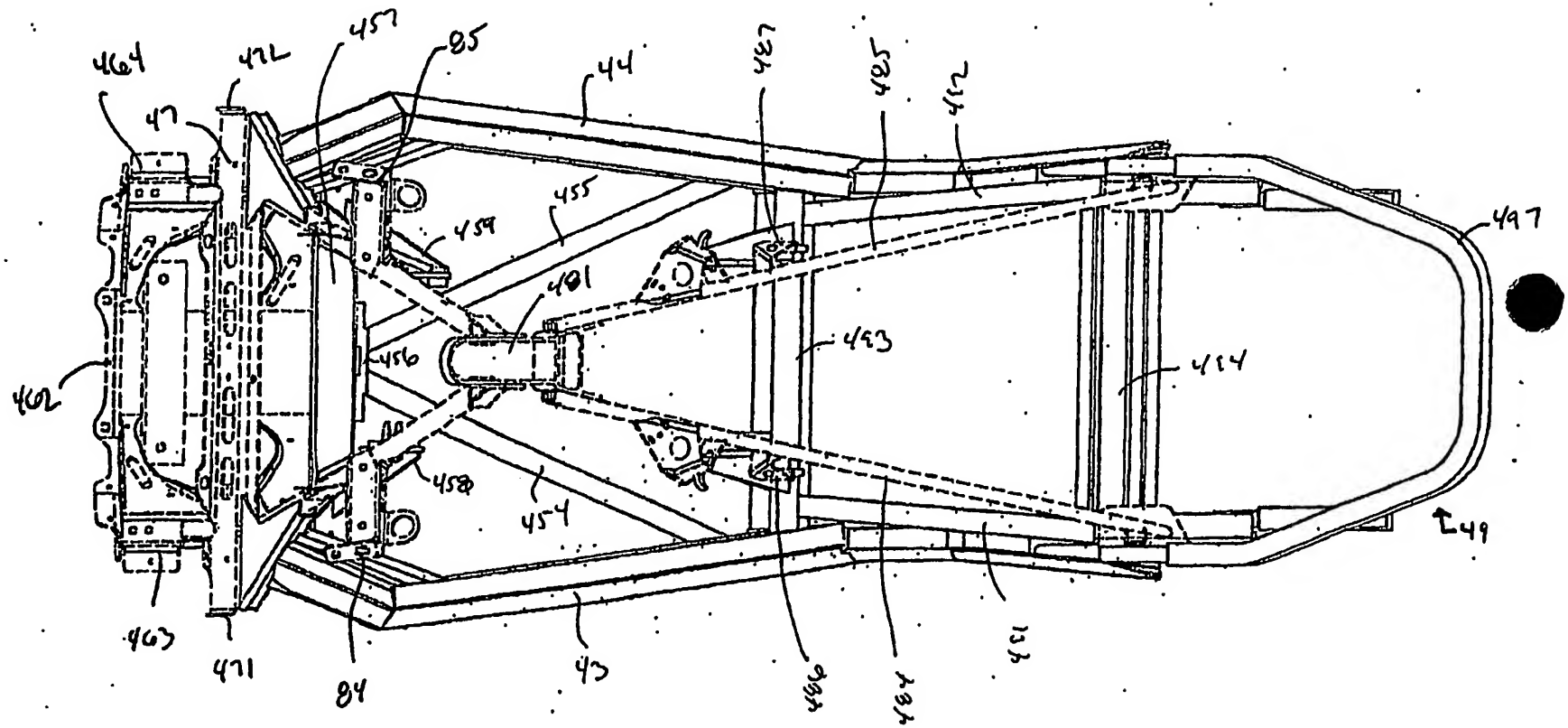
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FIG. 6

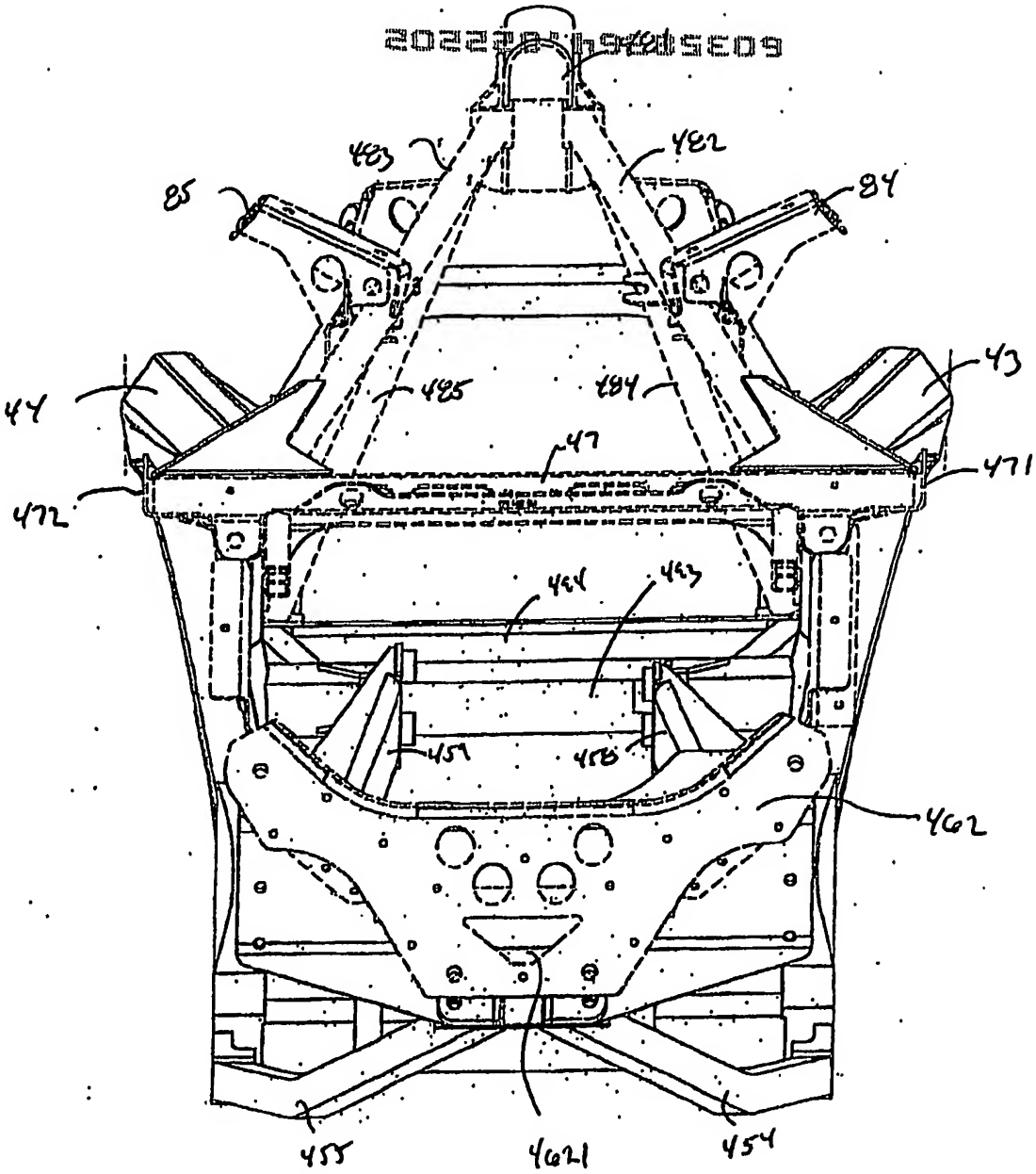
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FIG. 7

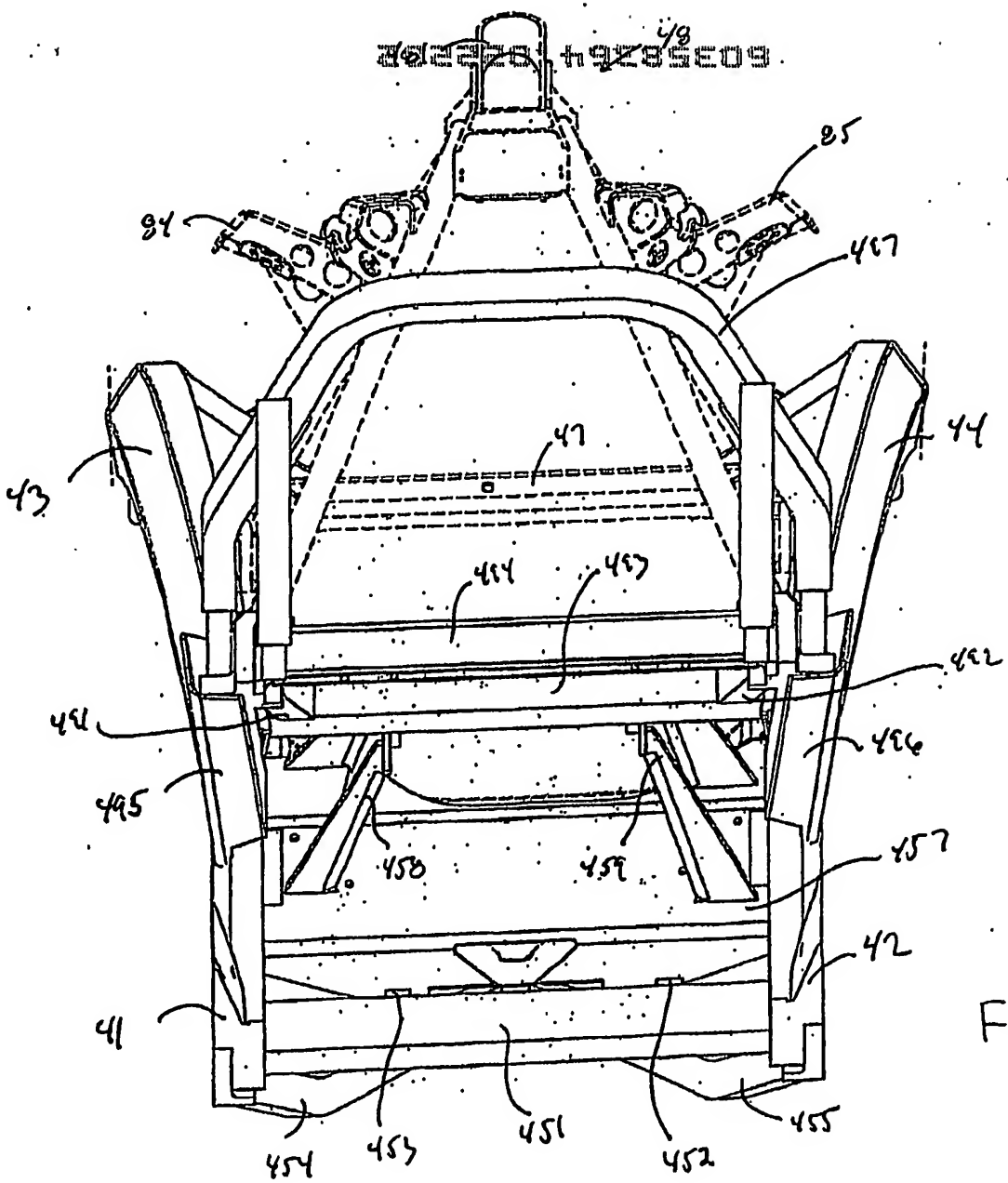
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FIG. 8

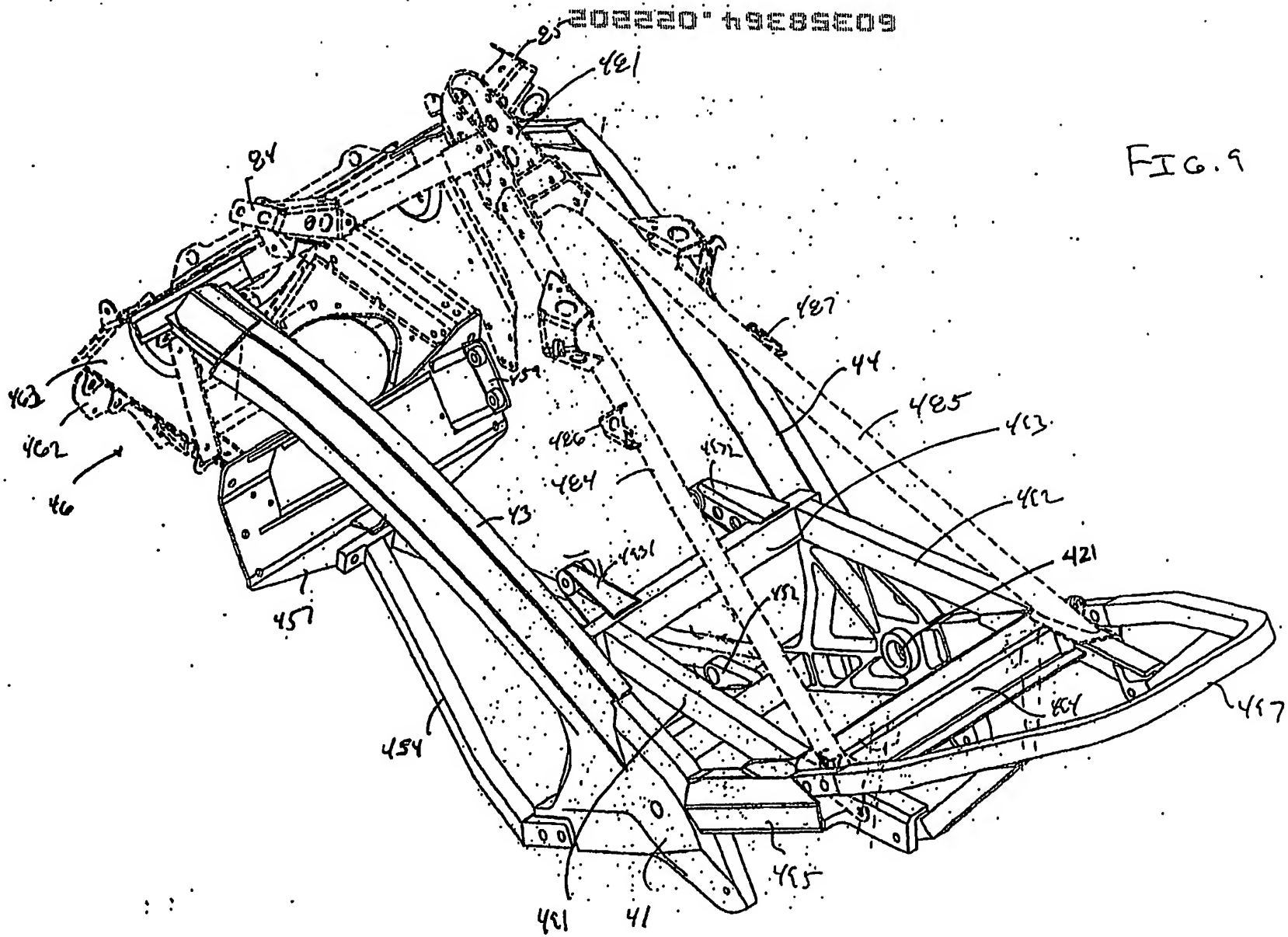
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FIG. 9

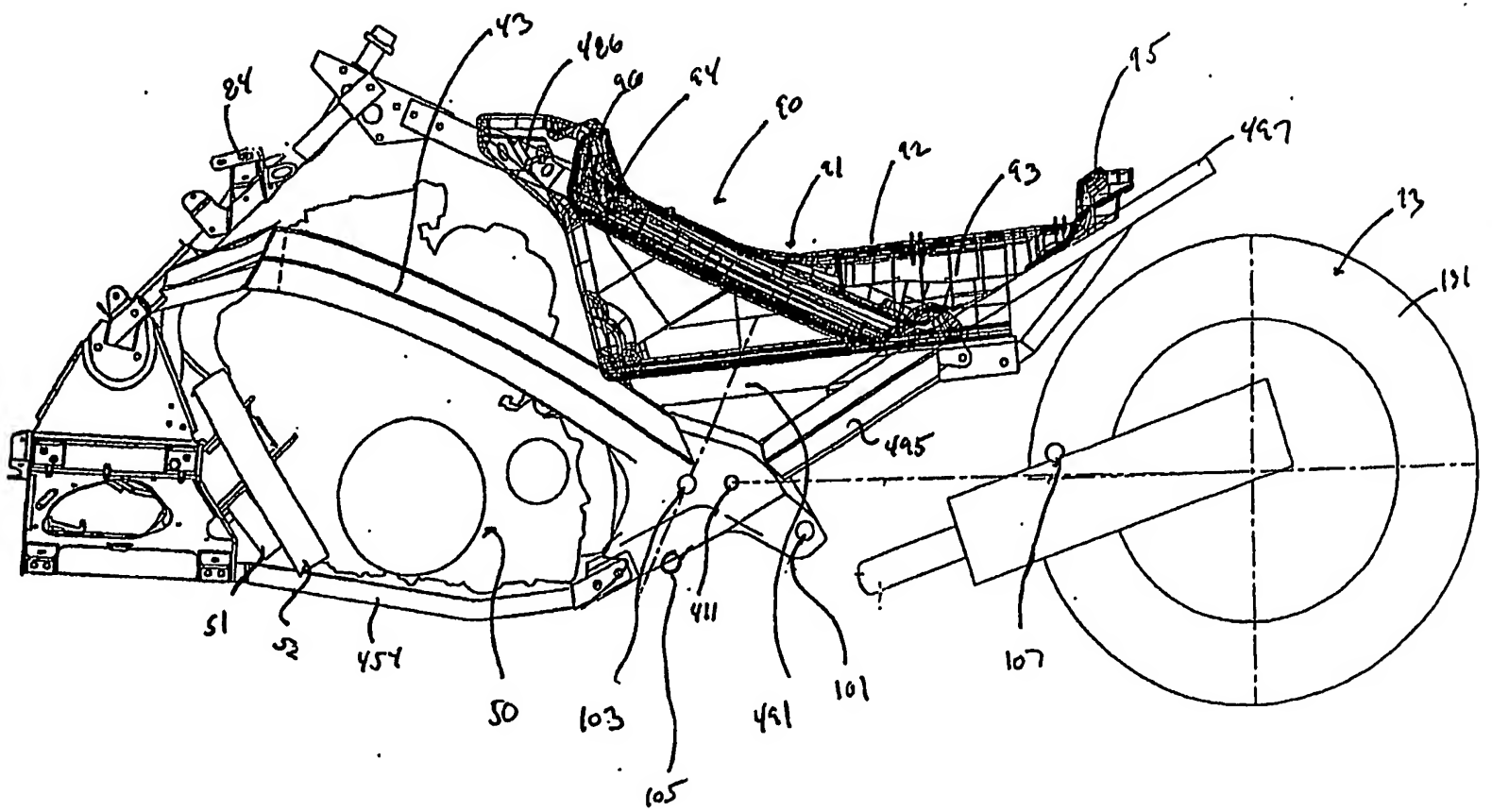
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FIG. 10

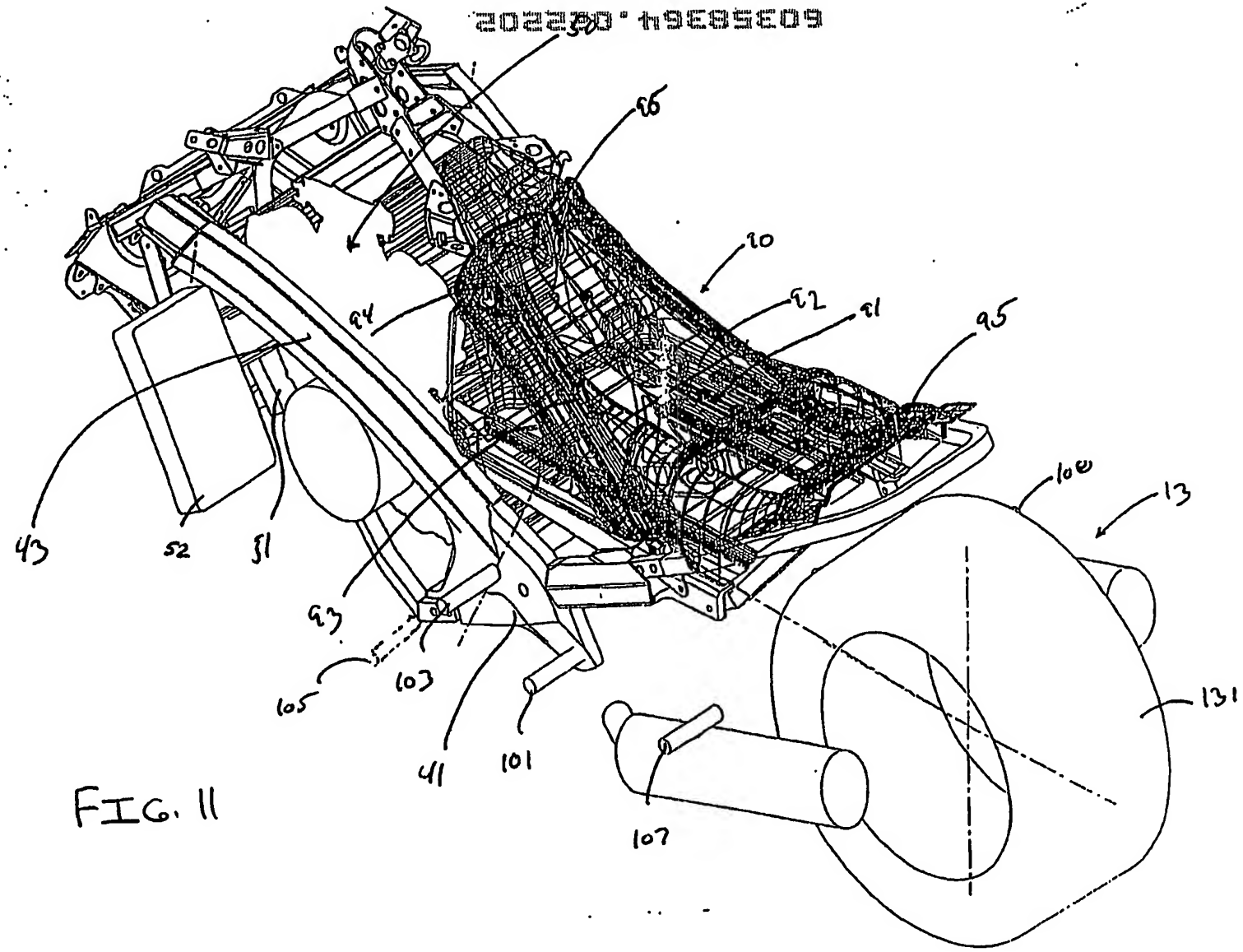

FIG. 11

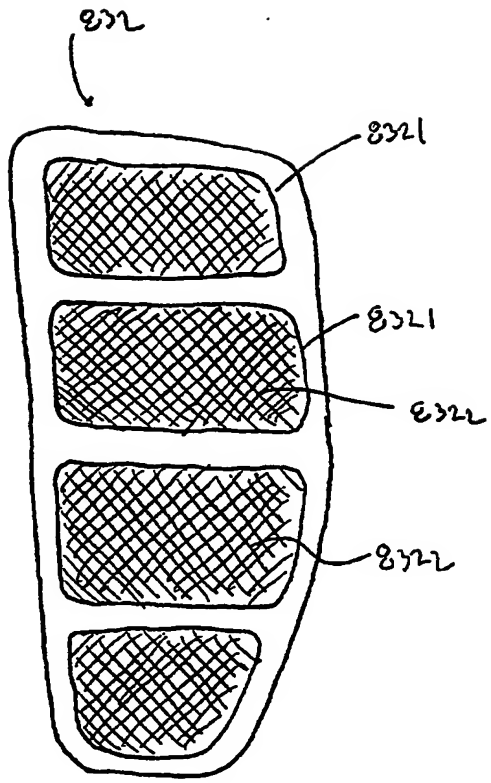

FIG. 12

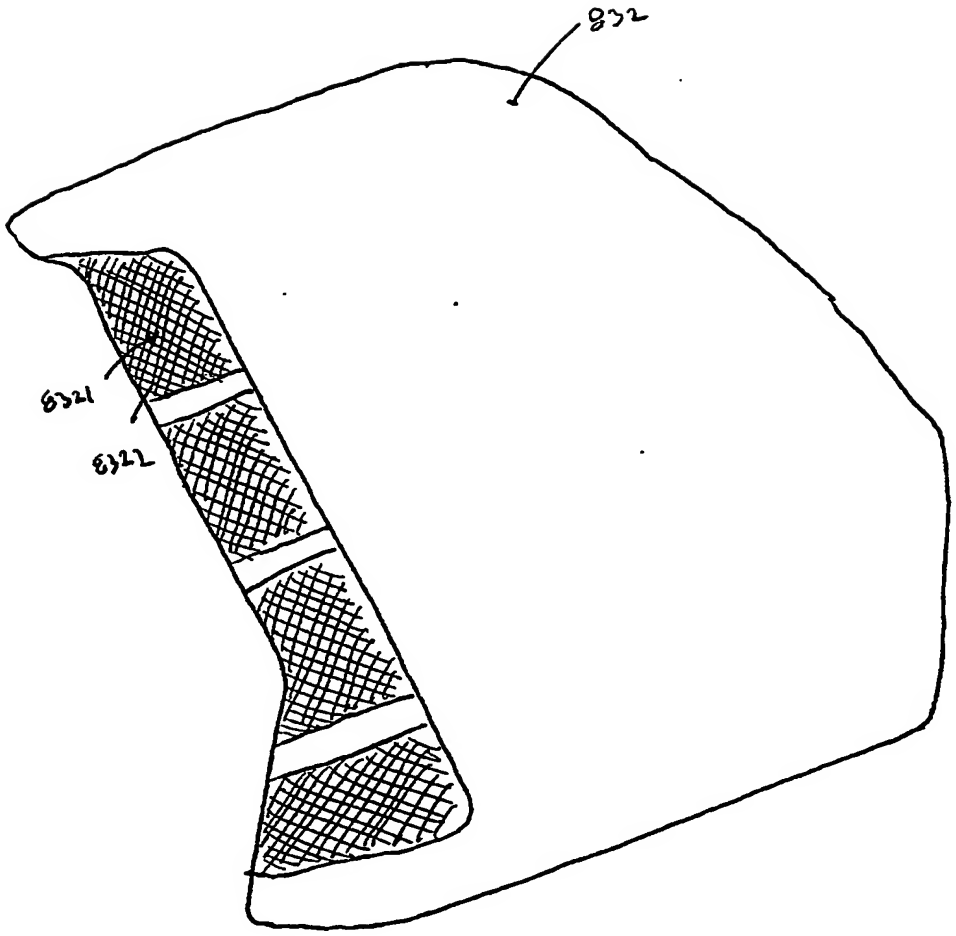

FIG. 13

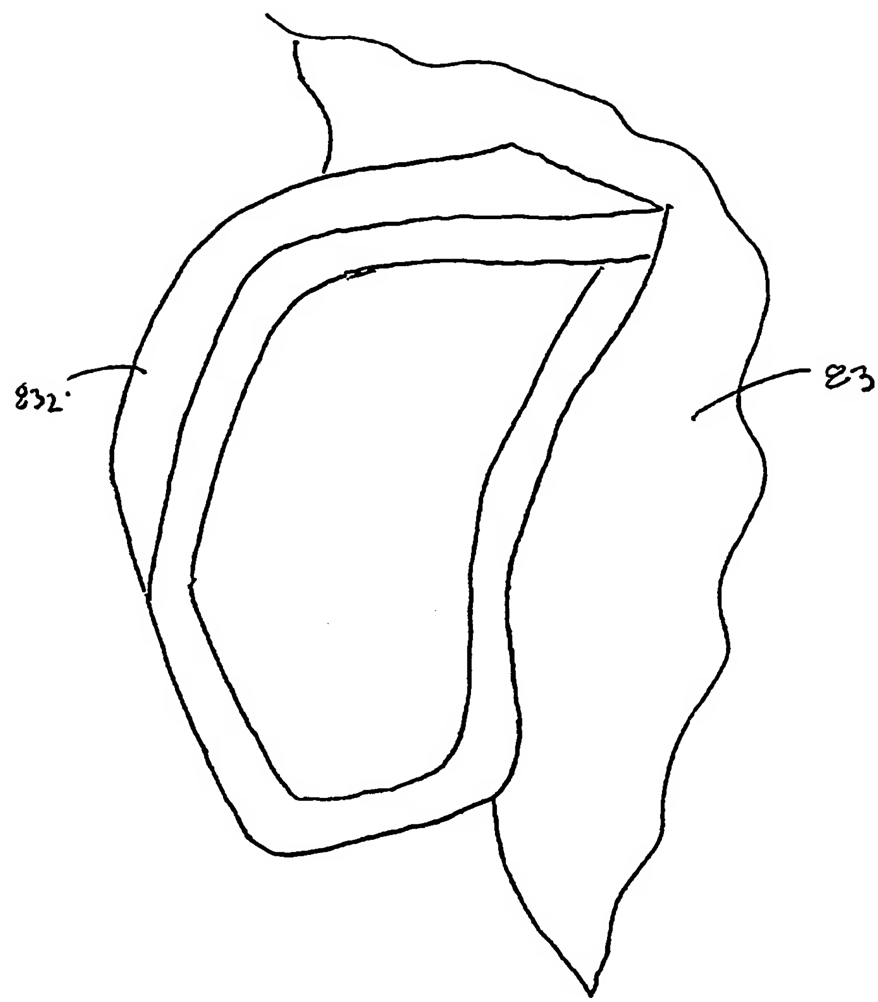

FIG. 14

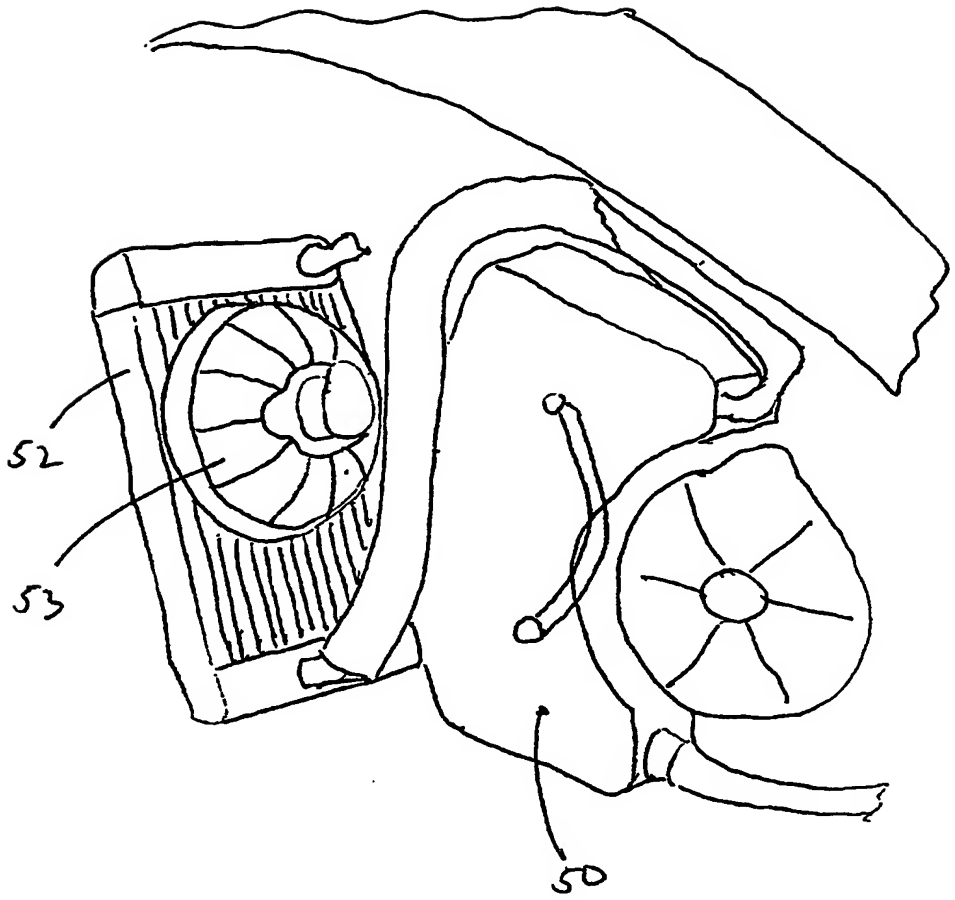

FIG. 15

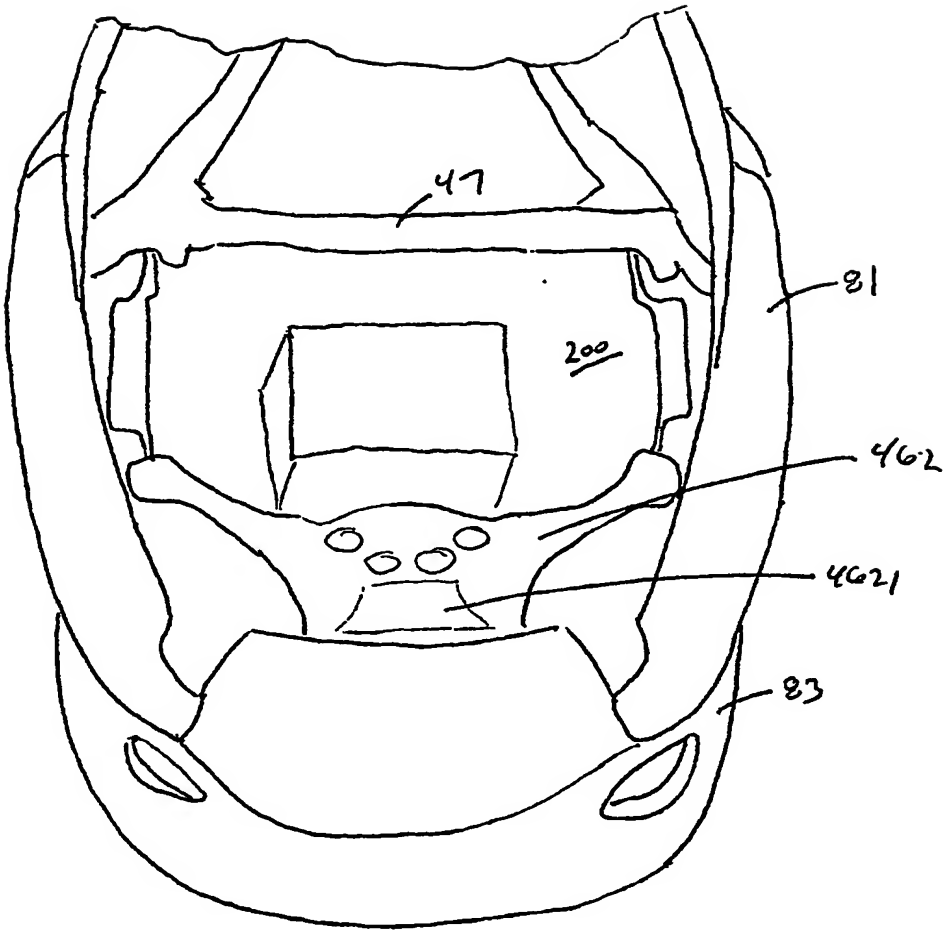

FIG. 16

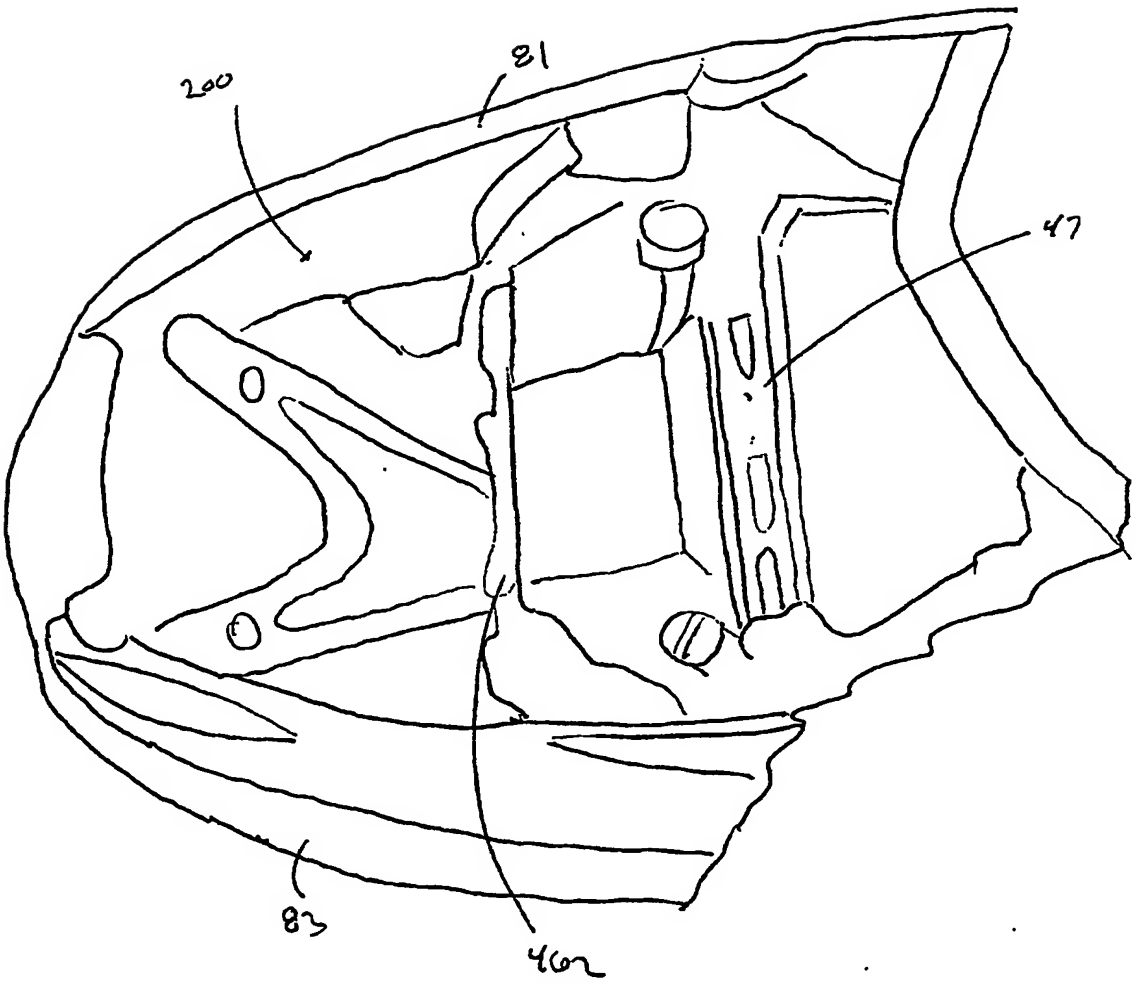

FIG. 17.

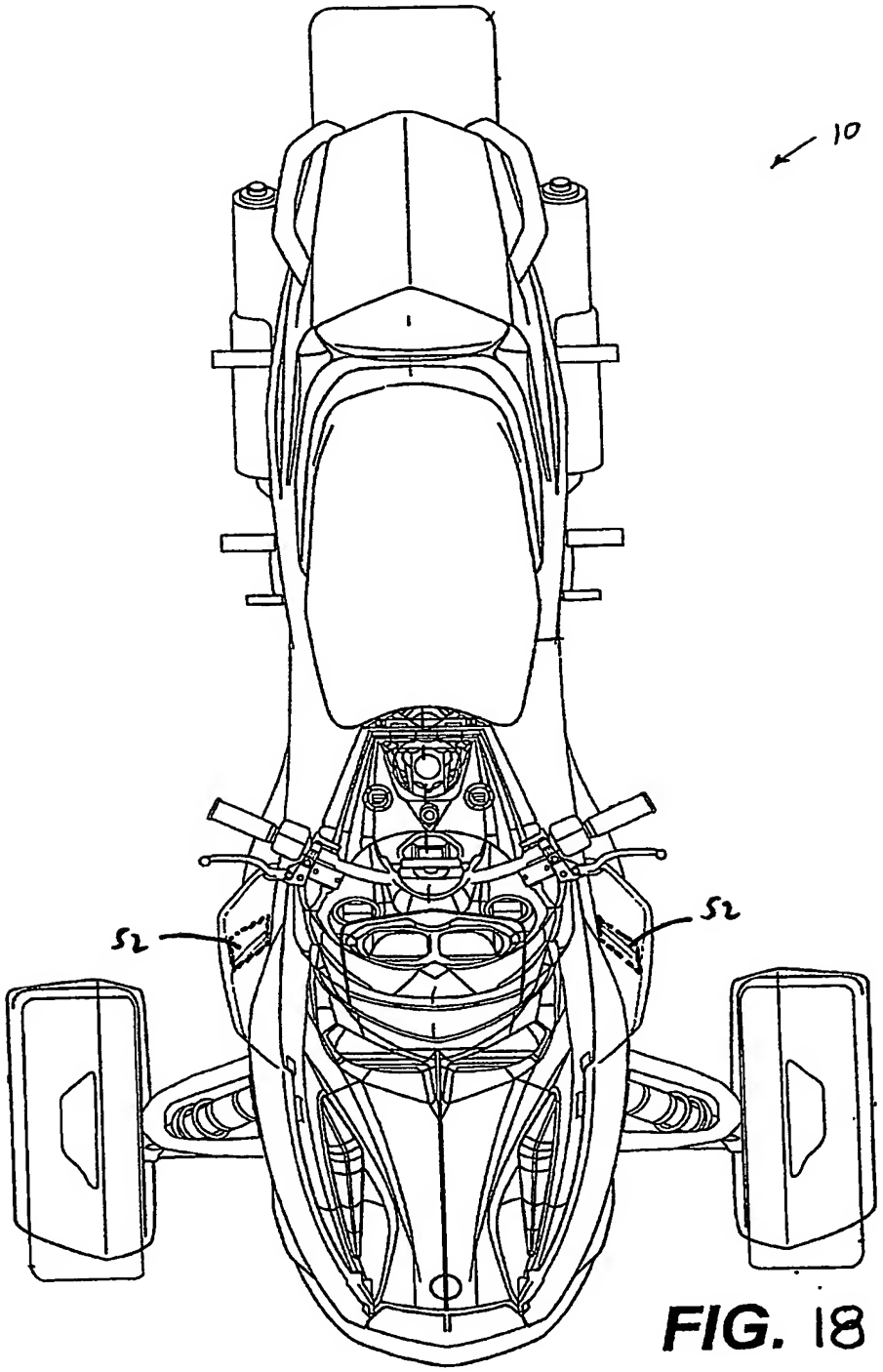

FIG. 18

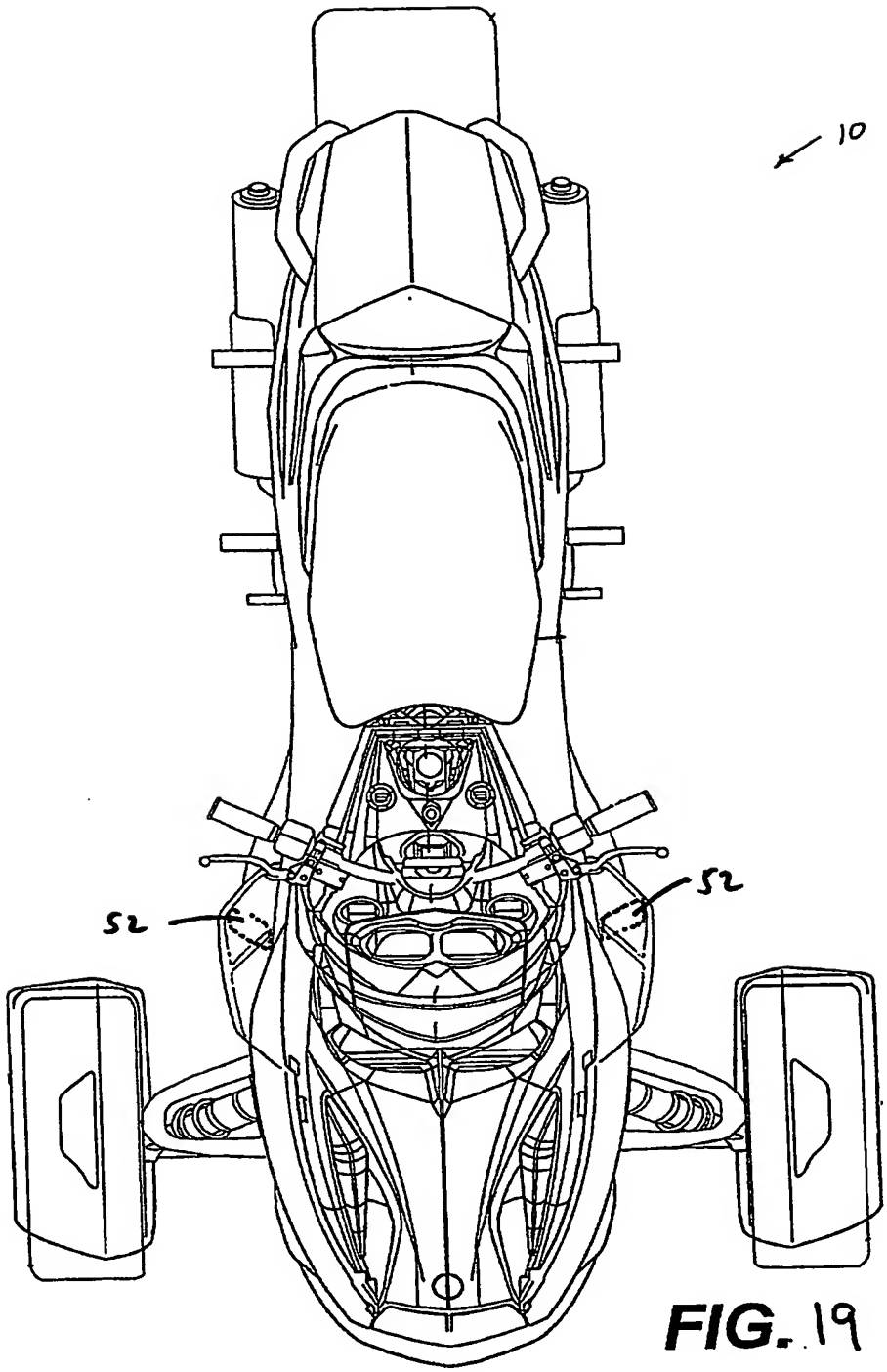

FIG. 19